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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/020,169	12/12/2001	Mahyar Zardoshti Kermani	LIFE-078	9292
24353	7590	04/21/2004	EXAMINER	
BOZICEVIC, FIELD & FRANCIS LLP 200 MIDDLEFIELD RD SUITE 200 MENLO PARK, CA 94025			BENSON, WALTER	
			ART UNIT	PAPER NUMBER
			2858	

DATE MAILED: 04/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/020,169	Applicant(s) KERMANI, MAHYAR ZARDOSHT	
	Examiner Walter Benson	Art Unit 2858	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 and 28 is/are pending in the application.
- 4a) Of the above claim(s) 26, 27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 17, 20-25 and 28 is/are rejected.
- 7) ☒ Claim(s) 16, 18, 19 and 25 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>12/12/01 & 2/26/04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

1. Claims 26-27 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Group, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 02/04/2004.
2. Claims 1-25, and 28 are now pending.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-3, 7-9, 12, 13, 20, 21, 23, 24, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kovacs et al. (US Patent No. 6,051,422 and Kovacs hereinafter) in view of Min et al. (Measurement 27 (2000) pages 21-28 and Min hereafter).
5. As to claim 1, 9, 20, and 28, Kovacs discloses an apparatus and method for measuring the effective capacitance across a biosensor cell having a first conductor connection and a second

conductor connection, the biosensor cell configured to receive a sample having a volume substantially as claimed, the apparatus and method comprising:

a sine wave generator having an output for coupling to the first conductor connection of the biosensor cell, the sine wave generator producing an AC signal (10, Fig. 1; col. 7, lines 19-23);

a current-to-voltage (VV) converter having an input for coupling to the second conductor connection of the biosensor cell and further having an output (12, Fig. 1; col. 12, lines 1-3);

Kovacs did not expressly disclose:

a phase shifter having an input coupled to the output of the I/V converter and further having an output;

a square wave generator producing a square wave synchronous with the AC signal;

a synchronous demodulator having an output, a first input coupled to the phase shifter, and a second input coupled to the square wave generator;

a low pass filter (LPF) having an input coupled to the output of the synchronous demodulator, the LPF producing a signal at an output proportional to an effective capacitance across the biosensor cell.

a DC voltage source coupled to the first conductor connection of the biosensor cell, the DC voltage source adding a DC component to the first conductor [claims 2, 12, 21];

where the phase shifter shifts the phase of a signal out of said I/V converter and removes the DC component from the signal out of the I/V converter [claims 3, 13];

where the sine wave generator generates a synthesized sine wave [claim 7];

where the synthesized sine wave is a stair type sine wave [claim 8]..

Nonetheless, these features are well known in the art and would have been an obvious modification of the system disclosed by Kovacs, as evidenced by Min.

In an analogous art, Min discloses a system for electrical bio-impedance measurements having:

- a phase shifter having an input coupled to the output of the I/V converter and further having an output (Fig. 7; page 24, column 1, paragraph 3, lines 1-3);

- a square wave generator producing a square wave synchronous with the AC signal (page 24, column 1, paragraph 3, lines 9-13);

- a synchronous demodulator having an output, a first input coupled to the phase shifter, and a second input coupled to the square wave generator (page 24, column 1, paragraph 3, lines 13-16);

- a low pass filter (LPF) having an input coupled to the output of the synchronous demodulator, the LPF producing a signal at an output proportional to an effective capacitance across the biosensor cell (page 24, column 2, paragraph 5, lines 12-23).

- a DC voltage source coupled to the first conductor connection of the biosensor cell, the DC voltage source adding a DC component to the first conductor [claims 2, 12, 21] (page 26, column 1, paragraph 7, lines 1-13) to compensate for DC offset voltages in amplifier;

- where the phase shifter shifts the phase of a signal out of the I/V converter and removes the DC component from the signal out of the I/V converter [claims 3, 13] (page 26, column 2, paragraph 7, lines 14-22) to solve the DC offset problems;

- where the sine wave generator generates a synthesized sine wave [claim 7] (Fig. 5; page 24, column 2, paragraph 4, lines 1-10) to lock the excitation to the biosensor with the output ;

- where the synthesized sine wave is a stair type sine wave [claim 8] (page 25, Fig. 6).

Art Unit: 2858

Given the teaching Min, a person having ordinary skill in the art at the time of the invention would have readily recognized the desirability and advantages of modifying Kovacs by employing the well known or conventional features of biosensor measurements, such as disclosed by Min, in order to reduce measurement errors for biological objects of interest and for the purposes discussed above.

6. As to claim 23, Kovacs discloses an apparatus and method for measuring the effective capacitance across a biosensor cell having a first conductor connection and a second conductor connection, the biosensor cell configured to receive a sample having a volume, the apparatus and method comprising:

processing the signal proportional to the effective capacitance of the biosensor cell to determine the volume of the sample received by the biosensor cell (col. 11, lines 27-39).

7. As to claim 24, Kovacs discloses an apparatus and method for measuring the effective capacitance across a biosensor cell having a first conductor connection and a second conductor connection, the biosensor cell configured to receive a sample having a volume, the apparatus and method comprising:

calibrating the biosensor (col. 10, lines 56-67 and col. 11, lines 1-15).

8. Claims 4, 5, 6, 10, 11, 14, 15, 17, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kovacs in view of Min as applied to claims 1, 9, 20, and 21 above, and further in view of Kolle et al. (Measurement Science Technology Vol. 9, 1998 pages 510-517).

Although the combine teaching of Kovacs and Min shows substantial features of the claimed invention (discussed above), it fails to disclose:

an analog-to-digital (A/D) converter having an analog input coupled to the output of the LPF and further having a digital output, the A/D converter converting the signal proportional to the effective capacitance across the biosensor cell from analog to digital [claims 4, 10];

a processor coupled to the digital output of said A/D converter to process said digital signal proportional to the effective capacitance across the biosensor cell to derive the effective capacitance across the biosensor cell [claims 5, 6, 11, 22];

an analog-to-digital (A/D) converter having a digital output and an analog input, said analog input coupled to the output of the I/V converter through a first switch and coupled to the output of the LPF through a second switch, only one of said switches being closed at a time [claim 14];

a filter coupled between the I/V converter and the A/D converter in a path containing the first switch to remove an AC component from the path [claim 15]

Nonetheless, these features are well known in the art and would have been an obvious modification to the system disclosed by Kovacs in view of Min as evidenced by Kolle.

In an analogous art, Kolle discloses a precision capacitance measuring system having:

an analog-to-digital (A/D) converter having an analog input coupled to the output of the LPF and further having a digital output, the A/D converter converting the signal proportional to the effective capacitance across the biosensor cell from analog to digital [claims 4, 10] (Fig. 2; Abstract) to provide precise measurements;

a processor coupled to the digital output of said A/D converter to process said digital signal proportional to the effective capacitance across the biosensor cell to derive the effective capacitance across the biosensor cell [claims 5, 6, 11, 22] (page 513, column 2, paragraph 4, lines 1-4) to perform data monitoring and recording;

an analog-to-digital (A/D) converter having a digital output and an analog input, said analog input coupled to the output of the I/V converter through a first switch and coupled to the output of the LPF through a second switch, only one of the switches being closed at a time [claim 14] (page 513, column 2, paragraph 4, lines 1-7) to cancel the DC offset and calibrate the sensor;

a filter coupled between the I/V converter and the A/D converter in a path containing the first switch to remove an AC component from the path [claim 15] (page 512, Fig. 2).

Given the teaching of Kolle, a person having ordinary skill in the art at the time of the invention would have readily recognized the desirability and advantages of modifying Kovacs in view of Min by employing the well known features of synchronous demodulation technique for capacitance measurements, such as disclosed by Kolle in order improve the accuracy of the biosensor measurement and for the purposes discussed above.

9. As to claim 17, Kovacs discloses an apparatus and method for measuring the effective capacitance across a biosensor cell having a first conductor connection and a second conductor connection, the biosensor cell configured to receive a sample having a volume, the apparatus and method comprising:

where the sample is blood and the component is glucose, and wherein said processor further calculates the glucose level for the sample of blood using the derived volume (col. 8, lines 8-14).

Allowable Subject Matter

10. Claims 16, 18, 19, and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art of record fails to teach or suggest individually or in combination an apparatus and method for measuring capacitance across a biosensor cell where a processor coupled to the digital output of the A/D converter to process the digital signal proportional to the effective capacitance across the biosensor cell when the second switch is closed. To process the output of the I/V converter to determine if the sample is of a specific type when the first switch is closed. Obtaining a first signal average for the digital signal proportional to the effective capacitance of the biosensor cell when the sample is not received by the biosensor cell. Obtaining a second signal average when a known capacitance is coupled across the biosensor cell. Calculating a capacitance conversion slope by dividing the value of the reference capacitor by the difference between the first signal average and the second signal average. Storing the capacitance conversion slope for correcting the signal proportional to the capacitance across the biosensor cell.

Prior Art Made of Record

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure

A. Beaty et al. (US Patent No. 6,645, 368 B1) discloses a method and apparatus for determining the concentration of a medically significant component of biological fluid;


B. Kindler (US Patent No. 5,494,831) discloses a method and apparatus for measuring binding events when in contact with a fluid.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter Benson whose telephone number is (571) 272-2227. The examiner can normally be reached on Mon to Fri 6:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, N. Le can be reached on (571) 272-2233. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Walter Benson 
Patent Examiner

April 15, 2004


N. Le
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